

1 **POWERED HOSE REEL SAFETY ENCLOSURE**

2 **Cross Reference to Related Applications**

3 This application is a continuation-in-part of
4 applicant's co-pending U.S. Application No. 29/154,133 filed
5 January 18, 2002, the contents of which are hereby
6 incorporated by reference. This application is also a
7 continuation in part of applicant's co-pending U.S.
8 Application No. 10/346,908 filed January 17, 2003, the
9 contents of which are hereby incorporated by reference.

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11 **Field of the Invention**

12 This invention is directed to a safety enclosure for
13 powered hose rewinding apparatus. More specifically, the
14 present invention relates to a protective safety enclosure
15 for electrically powered, motor driven hose reels.

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17 **Background of the Invention**

18 Elongated flexible members such as hoses or electrical
19 cords are a necessity for homeowners and industry alike.
20 Typically, these elongated flexible members are found either
21 wound and left on the ground near a fluid or electrical
22 supply, or wound on one of many known reel-type storage
23 devices.

1 The prior art has proposed a number of different
2 structures for rewinding and storing a flexible elongate
3 member when it is not in use. These devices generally
4 include stationary reel hangers that can be mounted to a
5 surface of a building or vehicle, as well as portable reel
6 carts that permit ready transport of the flexible elongate
7 member from one location to another.

8 For example, a typical surface mounted device or
9 stationary reel hanger includes a rotatable fitting that is
10 mounted to the building surface to which a manually rotated
11 reel is mounted. To retrieve the flexible elongate member
12 utilizing one of the stationary reel hangers requires
13 manually winding the flexible elongate member around the
14 structure or simply bundling the flexible elongate member
15 into loose coils and hanging the bundle over the structure.
16 Unfortunately, when hose is pulled out from such manually
17 wound devices, it often becomes snarled or tangled and
18 requires appreciable time and effort to correct the
19 situation.

20 Portable flexible elongate member reel carts permit
21 ready transport of the flexible elongate member from one
22 location to another. Portable flexible elongate member reel
23 carts typically include an open, manually rotatable reel or

1 spool positioned between a pair of side frames with wheels.
2 The flexible elongate member is manually wound upon the reel
3 for storage and pulled or dispensed from the reel for use.

4 Although such carts have become wide-spread in use
5 because of their portable storage capabilities, they do have
6 drawbacks. First, these devices require manual winding of
7 the hose. Rewinding a long flexible elongate member
8 requires a considerable effort. Due to the low positional
9 location of the winding mechanism on these devices, many
10 users may be physically unable to complete the rewinding.
11 Additionally, a flexible elongate member stored on such a
12 reel is exposed to the elements. Often flexible elongate
13 members are made of rubber or like materials that can become
14 stiff or brittle and can break when subjected to ultra-violet
15 radiation or low temperature extremes, particularly with
16 advanced age.

17 In an effort to solve some of these problems, a number
18 of flexible elongate member retrieval devices have been
19 developed which automatically retrieve and rewind flexible
20 elongate members on a reel in such a manner so as to avoid
21 tangling the next time the flexible elongate member is
22 deployed or paid out. Such devices generally include a
23 powered reel to retrieve the flexible elongate member and a

1 level wind mechanism for guiding the flexible elongate member
2 onto the reel. The reel is generally driven by the
3 combination of an electric motor and a speed reducer such as
4 a gearbox or a chain and sprocket assembly. Power for the
5 electric motor is generally provided by either household
6 current or a battery. A simple electrical switch is
7 activated to allow current to flow from the power supply to
8 the electrical motor to rotate the powered reel. The level
9 wind mechanism is typically also driven, via a drive train,
10 by the same electric motor and includes a traversing screw, a
11 guide rod, and a follower.

12 Unfortunately, many of these motorized devices lack a
13 suitably safe enclosure to protect the operator and/or small
14 children from being accidentally caught in the device or its
15 drive train. The motors and drive train mechanisms utilized
16 on these devices often have numerous pinch points and are
17 capable of causing serious injury to an operator that
18 inadvertently gets tangled in the device. In addition, the
19 electric motors utilized in most of the prior art devices
20 have voltage requirements that may cause an electrical shock
21 in the absence of adequate guarding.

22 Moreover, none of the motorized hose reels known, are
23 equipped with safety interlocks to prevent the electric motor

1 from being engaged if an enclosure cover is opened. To
2 compound the problem, many of these devices do not provide
3 any means to immediately stop the retrieval of the flexible
4 elongate member in the event of an emergency, requiring the
5 entire flexible elongate member to be retracted before the
6 device can be stopped. Retracting the entire flexible
7 elongate member may take several seconds and exacerbates
8 emergency situations such as when a person or pet has been
9 caught in the device or the flexible elongate member as it is
10 retracted.

11 Even further, none of the devices known provide a
12 disengaging level-wind mechanism. The level-winds of the
13 prior art are capable of causing severe damage to an
14 operator, child or pet that may accidentally obstruct the
15 path of the level-wind mechanisms as they traverse back and
16 forth across the reel.

17 Accordingly, there exists a need for a motorized reel
18 storage enclosure that permits safe motorized take-up of a
19 flexible elongate member. The enclosure should cause the
20 device to stop immediately when the enclosure is opened or
21 tipped over. In addition, the level-wind utilized in the
22 enclosure should disengage in the event that its path becomes
23 blocked. Moreover, the enclosure should provide a means for

1 an operator to quickly stop the retrieval of the flexible
2 elongate member in an emergency situation. Such an enclosure
3 should be capable of safely retracting and "hiding-away" the
4 flexible elongate member stored therein when not in use, and
5 provide a protective, outward aesthetically pleasing
6 appearance.

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1 **DESCRIPTION OF THE PRIOR ART**

2 A number of motorized reel assemblies utilizing electric
3 motors to drive a reel for retracting an elongate member such
4 as a cord or hose have been disclosed. Examples are
5 disclosed as follows:

6 U.S. Patent No. 4,832,074 discloses an automatic hose
7 rewinding device having an alternating current (AC) motor
8 driven reel. The desired amount of hose is pulled out of the
9 enclosure manually for use. After use, the operator pushes a
10 button and the hose is completely retracted until a device on
11 the end of the hose strikes a bar to disengage the AC motor.
12 The construction of the device requires the entire amount of
13 hose pulled from the device to be retracted and does not
14 teach or disclose any means of stopping the retraction in the
15 event of an emergency. Additionally, the patent does not
16 teach or disclose any type of interlock device that would
17 prevent operation of the motor in the event that a cover is
18 opened.

19 U.S. Patent No. 4,513,772 discloses an automatic hose
20 winding apparatus having an intermeshing, non-slipping
21 clutch. The desired amount of hose is pulled out of the
22 device manually for use. For retraction, the operator must
23 manually lock the intermeshing clutch mechanism in place.

1 When the hose is completely retracted, a device on the end of
2 the hose strikes a lever to disengage the intermeshing
3 clutch. The patent does not teach or suggest any type of a
4 protective enclosure or a level-wind.

5 U.S. Patent No. 5,495,995 discloses a motor driven hose
6 reel assembly. The device interconnects two sensors and a
7 motor to monitor the quantity of hose manually pulled from
8 the reel. By pulling on the hose manually, the hose is
9 rewound in an amount less than that necessary to completely
10 rewind the hose. Because the device is operated in a
11 retraction direction when the hose is pulled, the design
12 requires the operator to overcome the pulling force of the
13 device to extend hose from the machine. The patent does not
14 teach or suggest any type of a protective enclosure over the
15 reel portion of the device. In addition, the patent does not
16 teach or suggest any interlocks or disconnects which would
17 allow the device rewind cycle to be interrupted in an
18 emergency situation.

19 U.S. Patent No. 4,012,002 discloses a coupling mechanism
20 for use in conjunction with a hose reel to automatically and
21 selectively engage or disengage a reel and motorized drive
22 train. The coupling utilizes a sliding spring pin on the
23 reel which is designed to automatically engage one of a

1 series of cooperating stop lugs on the drive train to
2 transmit the driving power of the motor to the rotatable
3 reel. The spring pin can be manually locked in a disengaged
4 position to allow the hose reel to freewheel. When the
5 spring pin is engaged the device operates in direct drive
6 from the motor. The device utilizes chains and sprockets
7 within the drive train for which there is not any teaching or
8 suggestion of any type of a protective enclosure or a level-
9 wind.

10 U.S. Patent No. 6,149,096 discloses a retractable reel
11 device especially useful for electrical cables. The device
12 is specifically designed to allow an operator to pull out a
13 desired amount of cable. Once the cable is paid out, the
14 device maintains a predetermined amount of tension on the
15 cable. Thereafter, any slack in the cable is automatically
16 retracted by an AC motor. The patent does not teach or
17 suggest any type of a protective enclosure over the reel
18 portion of the device. In addition, the patent does not
19 teach or suggest any interlocks or disconnects which would
20 allow the device rewind cycle to be interrupted in an
21 emergency situation.

22 The prior art devices fail to teach or suggest the use
23 of an enclosure with safety interlocks that prevent the motor

1 from being engaged when a cover is in an open position. The
2 devices are further deficient in teaching a safety hose guide
3 assembly that is capable of disengagement in the event that
4 the path of the device is inadvertently blocked. The prior
5 art devices are still yet deficient in teaching an enclosure
6 with safety interlocks that prevent or stop operation of the
7 motorized reel when the device has been overturned.

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1 Summary of the Invention

2 The instant invention relates to a safety enclosure for
3 use with an associated powered flexible elongate member
4 rewinding reel. The enclosure has left and right side wall
5 panels, front and rear wall panels extending between the left
6 and right wall panels, a cover, and at least one safety
7 interlock. The enclosure is configured for receiving a
8 motorized rotatable reel for storing a length of flexible
9 elongate member within the enclosure. The rotatable reel
10 includes a hub and a pair of flanges at opposing ends of the
11 hub, and is configured for storage, motorized take-up, and
12 pay-out of the flexible elongate member. The safety
13 interlock(s) are incorporated into the enclosure and prevent
14 motorized operation of the reel when the enclosure is opened
15 or tipped over.

16 The cover pivots about a pair of hinges that mount the
17 cover to the enclosure for movement between a closed position
18 and an open position. In a preferred embodiment each hinge
19 includes a pocket formed in a respective side wall panel and
20 a pin associated and cooperative with each pocket. The cover
21 can be formed having a depending lip, and the pins can extend
22 from the lip. Preferably, the pins are formed as cylindrical

1 elements extending from the lip, axially aligned to one
2 another to facilitate rotational movement.

3 When the cover is rotated into the open position and the
4 interior of the enclosure is accessible, a safety interlock
5 switch assembly prevents motorized operation of the reel.
6 When the cover is rotated into the closed position, the cover
7 cooperates with the safety interlock switch to allow
8 motorized operation of the reel and the interior of the
9 enclosure is covered.

10 To facilitate take-up and pay-out of the flexible
11 elongate member with the cover closed, the front wall panel
12 includes a cut-out portion extending downward from the top
13 edge thereof adjacent to the junction with the cover. In
14 this arrangement, when the cover is closed, the cut-out
15 accommodates traversing a portion of the flexible elongate
16 member therethrough.

17 In one embodiment a reciprocating level-wind assembly is
18 linked to the hose reel. When the hose reel is rotated, the
19 reciprocating level-wind will move back and forth across the
20 reel to uniformly and smoothly wrap the flexible elongate
21 member on the motorized reel to provide a compact storage
22 configuration. The reciprocating level-wind is constructed
23 and arranged to be released from its double-helix lead-screw

1 in the event that its path becomes blocked, such as by debris
2 or when a hand or arm is mistakenly placed in the opening
3 during operation. Alternatively, the level-wind may be
4 manually disengaged to facilitate easy pay-out of the
5 flexible elongate member and can thereafter be repositioned
6 before being manually re-engaged to the double-helix lead-
7 screw.

8 Therefore, it is an objective of the present invention
9 to provide a motorized reel safety enclosure wherein the
10 motorized portion of the device is prevented from operation
11 when a portion of the enclosure is opened.

12 It is another objective of the present invention to
13 provide a motorized reel safety enclosure wherein the
14 motorized portion of the device is prevented from operation
15 when the enclosure has been inadvertently overturned or
16 tilted beyond a predetermined range.

17 It is a further objective of the present invention to
18 provide a motorized reel safety enclosure that includes
19 safety interlocks to prevent motorized operation when the
20 enclosure is opened.

21 It is still a further objective of the present invention
22 to provide a motorized reel safety enclosure that includes a

1 manually disengageable and manually engageable level-wind
2 mechanism.

3 Yet another objective of the present invention is to
4 provide a motorized reel safety enclosure that includes a
5 level-wind assembly that automatically disengages in the
6 event that its path becomes blocked.

7 Still yet another objective of the present invention is
8 to provide a motorized reel safety enclosure that is
9 aesthetically appealing to consumers.

10 Other objectives and advantages of this invention will
11 become apparent from the following description taken in
12 conjunction with the accompanying drawings wherein are set
13 forth, by way of illustration and example, certain
14 embodiments of this invention. The drawings constitute a
15 part of this specification and include exemplary embodiments
16 of the present invention and illustrate various objects and
17 features thereof.

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1 Brief Description of the Drawings

2 FIG. 1 is a perspective view of the safety enclosure for
3 a powered reel device of the instant invention;

4 FIG. 2 is an exploded perspective view of the safety
5 enclosure for a powered reel device;

6 FIG. 3 is a perspective view illustrating the safety
7 enclosure for a powered reel device with the cover in an open
8 position;

9 FIG. 4 is a perspective view illustrating the safety
10 enclosure for a powered reel device with the cover in an open
11 position;

12 FIG. 5 is a partial section view with a portion thereof
13 being broken away, illustrating the top cover cooperating
14 with a safety interlock switch means;

15 FIG. 6 is a perspective view having the reel and the
16 level-wind omitted for clarity, illustrating the cover latch
17 arrangement

18 FIG. 6A is a partial section view, illustrating the
19 cover latch arrangement;

20 FIG. 7 is a partial rear view illustrating the recessed
21 anchoring apertures;

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1 Detailed Description of the Preferred Embodiment

2 It is to be understood that while a certain form of the
3 invention is illustrated, it is not to be limited to the
4 specific form or arrangement of parts herein described and
5 shown. It will be apparent to those skilled in the art that
6 various changes may be made without departing from the scope
7 of the invention and the invention is not to be considered
8 limited to what is shown in the drawings and described in the
9 specification.

10 Referring now to FIG. 1, generally, there is shown a
11 safety enclosure 100 in accordance with the principles of the
12 present invention. The safety enclosure 100 is generally
13 constructed and arranged to enclose a motor driven reel or
14 spool 12 onto which a flexible elongate member is
15 mechanically wound or taken up, and from which the flexible
16 elongate member is fed out or paid out.

17 The enclosure 100 includes front wall panel 30 and rear
18 wall panel 34, left side wall panel 32, right side wall panel
19 36, and a pivoting top or cover 38. Optionally, the
20 enclosure 100 can include a bottom panel (not shown) for
21 substantially fully enclosing and preventing unwanted access
22 to the powered reel 12 during operation. The optional bottom
23 panel is preferably constructed as a reversible member with a

1 enhanced friction engaging first surface and a relatively
2 smooth second surface. In this manner the bottom panel could
3 be inserted to prevent the apparatus from skidding on hard
4 surfaces where staking is not practical. In addition, the
5 bottom surfaces of the left side wall panel 32 and right side
6 wall panel 36 may be constructed with optional rubber pads 33
7 to further engage hard surfaces. As will be apparent from
8 the drawings, the front, rear and side panels 30-36, and the
9 cover 38 enclose the reel 12 such that the motorized reel is
10 substantially not accessible from outside of the enclosure 14
11 when the cover 38 is closed. Those skilled in the art will
12 recognize that this arrangement covers pinch points
13 associated with the motorized reel and the drive train
14 required to motorize the reel.

15 In a typical arrangement, the reel 12 is supported by
16 and rotatably mounted within the enclosure 100. The reel 12
17 generally includes a central hub and a pair of radially
18 extending flanges that are configured to accommodate a length
19 of the flexible elongate member wrapped around the hub
20 between the flanges. To prevent torquing and/or twisting of
21 internal components, the left side panel 32 is constructed
22 and arranged for a sliding seal arrangement 20 (FIG. 4)
23 mounted to the enclosure 100 at about the axis of rotation of

1 the reel 12. Those skilled in the art will recognize that
2 this arrangement permits the flexible elongate member to
3 remain in fluid communication with a fluid supply while the
4 motorized reel is rotated to rewind the flexible elongate
5 member.

6 In a first embodiment, the front panel 30 of enclosure
7 100 includes a cut-out portion 52 extending downwardly from
8 the top lip thereof. The cut-out portion 52 can be elongated
9 and is suitably sized to accommodate a flexible elongate
10 member so that the flexible elongate member can be paid-out
11 from or taken-up onto the spool 12 without lifting the cover
12 38. That is, the flexible elongate member can freely move
13 through the cut-out opening 52 without opening the cover 38.

14 In a most preferred embodiment, the front panel 30 of
15 enclosure 100 includes an elongated cut-out portion 52
16 extending downwardly from a top lip thereof. The cut-out
17 portion 52 is sized to accommodate a reciprocating level-wind
18 assembly 50 so that the flexible elongate member can be
19 uniformly and smoothly wrapped on the reel 12 to provide a
20 compact storage configuration or easily paid-out from the
21 spool 12 without lifting the cover 38.

22 The enclosure 100 may also include a drawer 44 extending
23 between the right and left side panels 36, 32, parallel to

1 the front panel 30. The drawer 44 is illustrated as opening
2 in a pivotal fashion but may also be configured to slide open
3 for accommodating storage of hose attachments and the like.
4 The drawer 44 (FIG.3) is constructed having sides 45 and a
5 rear wall 43 to prevent an operator from inadvertently
6 reaching into the enclosure during operation of the reel 12.

7 The enclosure 100 may include a foot pedal housing 40
8 extending inwardly into the right side panel 36 for housing a
9 foot pedal 42. The foot pedal 42 may be utilized for
10 operation of the motorized reel 12. The foot pedal housing
11 40 is used to protect the foot pedal from inadvertent
12 operation. The foot pedal housing 40 can be provided in a
13 variety of configurations suitable for protecting the pedal
14 42 from inadvertent operation, such configurations will be
15 recognized by those skilled in the art. Alternatively, those
16 skilled in the art will recognize the enclosure may include
17 buttons or switches mounted to the enclosure and positioned
18 to prevent inadvertent access to the motorized reel or its
19 associated drive train during operation, e.g. palm buttons
20 and the like. Because the enclosure prevents operation when
21 a cover is opened, remote transmitters and receivers well
22 known in the art may also be used to cause motorized
23 operation of the reel.

1 Referring to FIG. 2, an exploded view of the enclosure
2 is shown. The panels 30-38 are preferably molded components
3 formed from high strength polymeric (plastic) material, such
4 as polystyrene and the like. The panels 30-38 are most
5 preferably configured such that the front and rear panels 30,
6 34 have contoured projecting posts 70 that insert into
7 recesses or sockets 72 that extend vertically along each side
8 of the side wall panels 32, 36. The contoured posts 70
9 include ramped surfaces or snap-type elements 76 that engage
10 openings (not shown) to lock the panels to one another.
11 Advantageously, this configuration permits ready assembly of
12 the enclosure 100 with a minimum number of tools, and
13 involves a minimum number of parts. Alternatively, the
14 enclosure panels could be constructed and arranged to be
15 secured together with other suitable means of fastening well
16 known in the art, e.g. screws, bolts, adhesive and the like.
17 The cover or top panel 38 is fitted to the panels 30-36
18 using a hinge arrangement indicated generally at 80 (FIG. 4)
19 and latch arrangement generally at 82, best seen in FIGS. 6
20 and 6A. The hinge arrangement 80 permits pivoting or
21 rotating the cover 38 between the closed position shown in
22 FIG. 1 and the open position shown in FIGS. 3 and 4. The
23 cover 38 is configured so that when opened and maintained in

1 the open position use of the motorized reel is locked out via
2 the lockout means (FIGS. 4 and 5).

3 The preferred hinge arrangement 80 includes a pocket 85
4 (FIG.2) formed in each of the side panels 32, 36 at about the
5 upper rear corners as indicated at (FIG. 4). A pair of
6 outwardly extending pivot pins 86 (FIG. 2), extend from each
7 side of the rear corners of the cover 38. In a present
8 embodiment, the cover 38 has a depending lip 88, from which
9 the pivot pins 86 extend. Each of the pivot pins 86 is
10 configured to engage a respective pocket. The pins 86 are
11 configured to cooperate with their respective pocket to
12 permit pivoting or rotating the cover 38.

13 Now referring to FIGS. 4 and 5, the motorized hose
14 rewinding apparatus 100 is illustrated with the cover 38 and
15 drawer 44, in their respective open positions. Incorporated
16 into the enclosure cover 38 is at least one lockout means
17 that prevents the motorized reel from operating when the
18 cover 38 is in the open position. The lockout means is
19 illustrated as, but not limited to, an engagement pin 64
20 cooperating with a normally open micro-switch 68 (FIG. 4).
21 Other devices well known in the art suitable for sensing an
22 open cover panel and locking out electrical devices may be
23 substituted for the pin and switch assembly illustrated

1 herein. Such devices may include but should not be limited
2 to micro-switches, proximity switches, mercury switches,
3 mechanical switches, optical switches and the like.

4 Also visible is the reciprocating level-wind assembly
5 50. The reciprocating level-wind assembly contains a double
6 helix lead-screw 54, guide rod 56, and carriage 58. The
7 reciprocating level-wind assembly 50 is linked via a gear-
8 train (not shown) to the reel 12 so that when the hose reel
9 12 is rotated, the double helix lead-screw 54 rotates at a
10 desired ratio with respect to the reel 12. The lead-screw is
11 journaled for rotation between side members 32 and 36 and is
12 substantially parallel to the central hub portion of reel 12.
13 The lead-screw 54 engages the carriage 58 via follower 66,
14 allowing the carriage 58 to move back and forth across the
15 lead-screw 54 and the guide rod 56 when engaged during
16 motorized operation. The follower 66 can be manually
17 disengaged from the lead-screw 54 to permit easy pay-out of
18 the flexible elongate member or repositioning of the carriage
19 58. Operation of the level-wind assembly 50 permits the
20 flexible elongate member to be uniformly and smoothly wrapped
21 on the reel 12 to provide a compact storage configuration.
22 The follower 66 may also include a disengagement feature that
23 permits the carriage 58 to release from the lead-screw 54 in

1 the event that the carriage 58 is obstructed during motorized
2 rewinding of the flexible elongate member.

3 The enclosure 100 may also be constructed and arranged
4 with an anti-tipping means (not shown) to prevent operation
5 of the powered reel when the enclosure has been overturned
6 or tipped beyond a predetermined limit. In a preferred
7 embodiment the anti-tipping means utilizes at least one
8 mercury switch secured within the enclosure. However, other
9 devices well known in the art suitable for sensing a tipped
10 or overturned enclosure and locking out electrical devices
11 may be substituted for the mercury switch of the preferred
12 embodiment. Such devices may include but should not be
13 limited to micro-switches, proximity switches, mechanical
14 switches, optical switches and the like.

15 As illustrated in FIGS. 6 and 6A, the releasable latch
16 arrangement 82 is engagingly oriented when the cover 38 is in
17 the closed position. The latch arrangement releasably
18 secures the cover to the side, front, and rear panels to help
19 prevent children from opening the enclosure. The releasable
20 latching means is illustrated by, but should not be limited
21 to, a catch and detent arrangement. Other latching devices
22 well known in the art, capable of releasably holding the
23 cover of the enclosure in a closed position, may be utilized.

1 In the closed position, the catches 90 extending from the
2 depending cover lip 88 are engaged with the respective side
3 panels 32 and 36. To open the cover 38, it is necessary to
4 pivot the cover 38 upward which releaseably urges the catches
5 90 upward past the detents 92.

6 Referring to FIG. 7, the lower portion of rear panel 34
7 of enclosure 100 is shown. The rear panel contains at least
8 one and preferably two recessed anchoring apertures 128. The
9 recessed apertures allow the enclosure to be securely
10 attached to a desired surface with an attachment means such
11 as lag bolts, spikes or metal stakes, to prevent unwanted
12 movement overturning or tipping of the apparatus during
13 motorized rewinding or pay-out of flexible elongate member.
14 It should be appreciated that recessing the anchoring
15 apertures 128 increases safety by eliminating objects
16 extending outwardly from the enclosure.

17 All patents and publications mentioned in this
18 specification are indicative of the levels of those skilled
19 in the art to which the invention pertains. All patents and
20 publications are herein incorporated by reference to the same
21 extent as if each individual publication was specifically and
22 individually indicated to be incorporated by reference.

1 It is to be understood that while a certain form of the
2 invention is illustrated, it is not to be limited to the
3 specific form or arrangement herein described and shown. It
4 will be apparent to those skilled in the art that various
5 changes may be made without departing from the scope of the
6 invention and the invention is not to be considered limited
7 to what is shown and described in the specification.

8 One skilled in the art will readily appreciate that the
9 present invention is well adapted to carry out the objectives
10 and obtain the ends and advantages mentioned, as well as
11 those inherent therein. The embodiments, methods, procedures
12 and techniques described herein are presently representative
13 of the preferred embodiments, are intended to be exemplary
14 and are not intended as limitations on the scope. Changes
15 therein and other uses will occur to those skilled in the art
16 which are encompassed within the spirit of the invention and
17 are defined by the scope of the appended claims. Although
18 the invention has been described in connection with specific
19 preferred embodiments, it should be understood that the
20 invention as claimed should not be unduly limited to such
21 specific embodiments. Indeed, various modifications of the
22 described modes for carrying out the invention which are

1 obvious to those skilled in the art are intended to be within
2 the scope of the following claims.